Co., Wash.). A teneral specimen was taken April 22 (Seattle), so that larval hibernation may also occur in this species.

Lindroth (1961. Opusc. Entomol., Suppl. 20: 1–200) has described the habitat of *L. ferruginosus* as "on moderately moist, half shaded ground usually near running water." I have found it in such situations though usually away from water, but also in the following habitats: at the edge of a snowfield (Whatcom Co., Wash., Hannegan Pass 3000′, Sept. 30); under large rubble constantly drenched by spray of a waterfall (Marion Co., Ore., Silver Creek Falls); and on the seabeach near the mouth of a small tidal creek in association with *Dyschirius obesus* LeC. and *Bembidion tigrinum* LeC. (Clatsop Co., Ore.). At the first two localities cited the *Leistus* were associated with staphylinids of the genus *Phlaeopterus*. Although the maritime occurrence may have been untypical, it appears that *L. ferruginosus* can survive in a variety of microthermal habitats.

An unusual behavioral characteristic which seems to have escaped notice is the pronounced tendency of *L. ferruginosus* to ascend moist, shaded vegetation. I have swept or beaten this species from salmon berry (*Rubus spectabilis* Pursh) thickets in Washington and Oregon. Eleven specimens were taken in 20 minutes sweeping at sunset (Coos Co., Ore.), including one hand-collected approximately 1 meter above the ground. Scansorial behavior is somewhat surprising in the terrestrial Nebriini, though similar behavior has been noted in the cychrine *Scaphinotus angusticollis* Mnh. in coastal forests (Van Dyke, 1944. Entomol. Amer., 24: 1–9).

Unless stated otherwise, all records are based on material in the author's collection.—LOREN RUSSELL, *828 NW 27th Street, Corvallis, Oregon 97330.*

Ecological Notes on Chagas' Zoonosis in New Mexico.—While recording the biogeographical distribution of Chagas' zoonosis and triatome insect vectors in New Mexico, Wood & Wood (1961, Amer. J. Trop. Med. & Hyg., 10: 155–65) reported a collection from Chaco Canyon National Monument of 11 *Triatoma protracta protracta* (Uhler), which were renamed *Triatoma protracta navajoensis* Ryckman (Ryckman, 1962, Univ. Calif. Publ. Entomol., 27: 114–15). Deducting those specimens named *T. p. navajoensis*, Table 1 of Wood & Wood (1961, loc. cit.) should now read 445 *T. p. protracta* collected, 436 examined and 16 or 3.8% infected instead of 456-442-18-4%. Corresponding data for the *T. p. navajoensis* in 1961 should be 11, 6, and 2 or 33% infected. The Navajo conenose bug has been known for its annoyance to man in Chaco Canyon since 1952 when 1 ♂ and 1 ♀ naturally-infected with *Trypanosoma cruzi* Chagas were received from L. P. Arnberger (Wood, 1953, Bull. So. Calif. Acad. Sci., 52: 57–60; 56: 51, 99). The first *T. p. navajoensis* reported infected with *T. cruzi* in Utah was from a cabin in Wayne County (Ryckman, 1962, loc. cit.).

During the summers of 1962 and 1963, we investigated conenose bug annoyance to humans at Chaco Canyon, which yielded additional data. Cooperative collecting by all personnel at the Monument produced 18 *T. p. navajoensis* in 1962 and 9 in 1963. Single specimens received in 1961 and 1964 raised the total for the Chaco Canyon personnel living areas to 40 (15 ♂, 22 ♀, 3 5th instar nymphs) with 34 (13 ♂, 18 ♀, 3 5th instar nymphs) examined including 8 (2 ♂, 6 ♀) or 23.5% infected with *Trypanosoma cruzi.* Four *T. p. navajoensis* were taken from house trailers and 24 from houses. These included infected bugs: 1 ♂, 1 ♀ in bedrooms and 1 ♀ in bathroom, and uninfected bugs: 1 ♂, 4♀, 1 5th instar

nymph in bedroom; 2 ♀ in kitchen and 2 ♀ in living room. Nine bugs were captured outside homes. Infected were 1 ♂, 2 ♀ near a "blacklight" (loaned by the Los Angeles County Museum of Natural History) and white muslin "bug sheet" and 1 ♀ in an empty Sherman live trap set near the canyon wall. Uninfected were 2 ♂, 1 ♀ on front porches, 1 ♂ near the blacklight and 1 5th instar nymph in a live trap. One infected ♀ was captured inside the visitor center. No *Triatoma* annoyance had been noted in recent years in Chaco Canyon according to Archaeologist J. E. Mount.

From 1957 through 1960, Superintendent R. Taylor Hoskins and Naturalist Paul F. Spangle forwarded triatomes to us from Carlsbad Caverns National Park. Table 1 of Wood & Wood (1961, loc. cit.) included only the 1957 and 1958 specimens of *Triatoma gerstaeckeri* (Stål). Additional bugs received in 1959 brought the totals to 47 collected, 43 examined with 5 or 11.6% infected with *Trypanosoma cruzi*. Sites of capture, where specified, for *T. gerstaeckeri* were as follows: inside homes (25): infected: 1 ♂ in living room; 1 ♂ in bathroom; uninfected: 1 ♀ in living room; 1 ♂, 1 ♀ in bedroom; 1 ♂, 1 ♀ in bathroom; and 1 ♀ among stored carpets. Two uninfected males were from the visitor center. Twenty bugs were captured outside houses: infected: 2 ♀ at the cave entrance and 1 ♀ collected by Dr. Gerald Harwood when it flew into the open windows of a parked car at night; uninfected: 9 ♂, 1 ♀ on porches, 6 ♂ from outside screens, and 1 ♂ behind the visitor center. An infected *T. gerstaeckeri* in a car in the parking lot suggests a possible dispersal method for this insect vector. High summer temperatures could be lethal for most specimens in cars, but many cars with air conditioning could harbor and transport live *Triatoma* hundreds of miles from Carlsbad Caverns.

Most *Triatoma protracta woodi* Usinger were found in *Neotoma* dens (Table 1, Wood & Wood, 1961, loc. cit.); however, 1 ♂ and 2 ♀ were collected inside homes at Carlsbad Caverns. One ♂ was taken on 24.VII.1957 from under a damp cloth under the kitchen sink and 2 ♀ on 6.VI.1960 were from beds. One ♂ was found outside a home on 6.VIII.1958. All were negative for trypanosomes.

Recent correspondence from Environmental Specialist Philip F. Van Cleve at Carlsbad Caverns reports "no annoyance" from *Triatoma* since 1968, although a few specimens were found in areas of the visitor center and residences during the summer seasons. The reduced incidence of *Triatoma* seems to be associated with a reduction of the local small mammal population through improved waste-disposal techniques.

In southwestern United States, humans may be protected from Chagas' disease, because of infrequent contacts with infected *Triatoma* due to better housing with screening of doors and windows, exposure to smaller contaminative droplets with fewer infective parasites per unit volume of feces (Wood, 1960, Exptl. Parasitol., 10: 356–65), and the rapid evaporation of infected bug feces from the surface of the skin in hot weather. Shorter feeding times for the insect vectors, delayed defecation (Wood, 1951, J. Econ. Ent., 44: 52–54) and rapid dispersal from the host after feeding probably reduce the potential for bite wound contamination.

Human infection in the United States has so far been linked by Woody et al (1961, J. Pediat., 58: 744) to association with *T. gerstaeckeri* (28 mm), a larger species than *T. p. navajoensis* (20–23 mm). *Triatoma p. navajoensis* is the largest of the widespread North American "*protracta* complex" of conenose bugs (Ryckman, 1962, Univ. Calif. Publ. Entomol., 27: 93–240). The blood meal size of *T. p. navajoensis* has been determined by Wood (1976, Ann. Entomol. Soc. Amer.,

In Press). Subspecies *protracta* and *woodi* take much less blood than *navajoensis* and, therefore, presumably become infected less often from rodent parasitaemias. The relatively smaller size of these insect vectors and consequent smaller amount of ingested blood may assume great importance for the infrequent contaminative transmission to man of this zoonosis of rodents in the United States.

The yet smaller size of *Paratriatoma hirsuta* Barber (12 mm) may explain, in part, why it has not been found naturally-infected despite our examination of 486 specimens. *P. hirsuta* is readily infected experimentally with Chagas' trypanosome by feeding on an infected *Peromyscus* (Wood, 1941, Pan-Pac. Entomol., 17: 117). One negative ♂ *P. hirsuta* and 1 positive 5th instar *T. rubida uhleri* nymph were found in the same wood rat den at the Alvarado Mine, near Congress, Yavapai County, Arizona on 30.V.1940. Twelve *P. hirsuta* nymphs taken in wood rat dens in the same location on 21 & 22.XII.1940 were also negative. This was at a time of winter temperature stress for the rats, a condition which should have stimulated higher parasitaemias, as noted in Griffith Park, Los Angeles (Wood & Wood, 1967, Pacific Insects, 9: 545). One negative ♀ *P. hirsuta* was collected 16.V.1956 from a bed in a home in Phoenix, Maricopa County, Arizona, where 1 positive ♀ *T. rubida uhleri* was picked up from the cement patio on 12.VI.1970 (Wood, 1975, Pan-Pac. Entomol., 51: 167–8). One negative ♂ *P. hirsuta* collected 9.VIII.1970 from the service room of a residence in Springdale, Washington County, Utah, was associated with 2 positive ♀ *T. p. protracta* collected 8 & 23.VII.1970 (Wood, 1973, Ibid, 49: 183–4). Probably heavy parasitaemias of reservoir mammals are necessary for *Paratriatoma* to become infected due to its much smaller blood meals.—SHERWIN F. WOOD AND FAE D. WOOD, *614 W. Shenandoah St., Thousand Oaks, CA 91360.*

MAILING DATES FOR VOLUME 52

No. 1—January ..... mailed 22 April 1976
No. 2—April ..... mailed 23 July 1976
No. 3—July ..... mailed 8 September 1976
No. 4—October ..... mailed 24 March 1977